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Indian Standard

SPECIFICATION FOR EDGE TYPE FILTERS REQUIRED FOR FILTRATION OF OILS OF STRAIGHT MINERAL TYPE

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SPECIFICATION FOR EDGE TYPE FILTERS REQUIRED FOR FILTRATION OF OILS OF STRAIGHT MINERAL TYPE

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Indian Standard

SPECIFICATION FOR EDGE TYPE FILTERS REQUIRED FOR FILTRATION OF OILS OF STRAIGHT MINERAL TYPE

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 26 July 1974, after the draft finalized by the Chemical Engineering Sectional Committee had been approved by the Mechanical Engineering Division Council.

0.2 Straight mineral oils including oils inhibited with rust and oxidation inhibitors are liable to deteriorate or contaminate in storage or service. The impurities contaminating these oils may consist of:

a) Moisture both in form of dissolved water and free water;
b) Sludge and other products of oxidation;
c) Carbonizing resulting from sparking in circuit breakers; and
d) Drum scale, rust and other extraneous matter.

0.3 Metallic impurities and those metallic parts in the system with which the oil comes in contact may act as catalysts and, therefore, enhance the rate of oxidation, resulting in deterioration of the oil.

0.4 Although, oils containing rust and oxidation inhibitors have longer service life, it is, nevertheless, necessary to remove by filtration or by centrifugal separation any deleterious matter, such as referred to in **0.2** to ensure optimum performance expected of the oil.

0.5 The principle of edge type filtration is used for the purification of used straight mineral oils where only traces of water might be present. In cases where water may be present also in the dissolved form, the filtration system shall incorporate suitably designed vacuum chambers for removal of moisture and other dissolved gases.

0.6 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2 - 1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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*Rules for rounding off numerical values (*revised*).

1. SCOPE

1.1 This standard covers technical provisions relating to the construction and other requirements of the edge type filters required for filtration of oils of straight mineral type.

2. CONSTRUCTIONAL REQUIREMENTS

2.1 The filter and its components shall have adequate strength and rigidity to withstand normal conditions of handling, transport and usage. There shall be no sharp edges or corners liable to cause injury on normal conditions of use. The design of the filter shall be such as to permit removal of any defective part and its easy replacement.

2.2 All parts which, due to their positions or the nature of their operations, are likely to cause accidents, shall be properly guarded during their normal use.

2.3 Tubes and wires, which are connected to resiliently mounted components, shall be properly taken care of, so that vibrations are reduced to a minimum and fatigue failure is avoided.

2.4 Materials used in the manufacture of filters shall be able to withstand satisfactorily the deteriorating effect of hot and humid climate and they shall neither deform nor twist under normal usage.

3. MATERIALS

3.1 Material used in the construction of the filters shall be free from defects which are liable to cause undue deterioration or failure. Under normal conditions of use, the materials used shall not shrink or warp.

4. FILTERING SYSTEM

4.1 Essentially the filtering system will consist of edge type filter in the form of closely compressed discs of specially treated paper or any other suitable material. Where water in dissolved form is present in the oil, vacuum chambers will be provided in the filtering system for removal of moisture and for the purposes of degassification.

4.2 The filter packs shall be easily removable for replacement and maintenance.

4.2.1 Provision shall be made for cleaning the filter packs by means of compressed air or any other suitable means. The provision of an air compressor/air bottle forming an integral part of the equipment will be optional.

4.3 Electric heater will be provided to heat the oil up to a suitable temperature to facilitate oil flow during filtration. Temperature up to 80°C is advantageous if vacuum is employed to remove water (*see* IS : 1866 - 1961*).

4.3.1 Due to extreme variation in climatic conditions all over India, the heater capacity should be based on minimum temperature of 0°C, so that the filtration plant may work at the same efficiency over a wide range of ambient temperature. The heater shall be provided with selector switches, wherever necessary, so that it can be operated on full load or part thereof depending on the ambient temperature of the oil.

4.3.2 For heating by steam, where required, the filters will be supplied with a jacket as an optional item.

4.4 Where the filtration plant is provided with vacuum chambers for dehydration and degassification, the oil undergoing filtration shall be exposed to a suitable vacuum for necessary removal of water. The vacuum pump provided shall be of adequate capacity and rated vacuum of not less than 680 mmHg at mean sea level to ensure constant removal of moisture and other gases.

4.5 A visual indicator together with the necessary controlling devices for regulating the level of the oil in the vacuum chamber shall be provided.

4.6 An indicating type thermometer and a vacuum gauge suitable for the purpose shall be provided. A thermostat shall also be provided in the heater system for controlling the temperature of the oil.

4.7 The whole unit shall be mounted on a platform of adequate strength for stationary execution, or on wheels or castors for moving on plain surface inside the plant.

4.8 The provision of used oil and clean oil receptacles is optional.

5. GENERAL REQUIREMENTS

5.1 The filter shall be capable of removing 99·9 percent of particles in the 1 to 4 micron range by providing suitable clearances.

5.2 Where the oil is contaminated with free and dissolved water up to 0·25 percent (2 500 ppm), the filter incorporated with vacuum chamber should be capable of reducing the water content to 60 ppm. In case of turbine oils and hydraulic oils where the saturation level is between 60 and 110 ppm at ambient temperatures, the filter shall be capable of delivering the oil clear and free from haze or water droplets.

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*Code of practice for maintenance of insulating oil.

5.3 Most of the oxidized matter in the used oil which is insoluble will be removed by filtration whereas the oil-soluble impurities which can be precipitated by addition of pentane or benzene are not likely to be removed by mere filtration. The pentane and benzene insolubles which indicate the content of oxidized matter in the used oil shall be reduced considerably after the filtration process. This may be gauged from reduction in the neutralization number in the filtered oil.

5.4 The filter shall be capable of reducing the neutralization number (acid value expressed in milligrams KOH/g of oil) of the used oil to a figure lower than that obtained for the unfiltered oil.

6. MARKING

6.1 Each filtering unit shall have the following information marked on the name plate:

a) Manufacturer's and/or supplier's identification;

b) Serial number of the filter to provide adequate identification; and

c) Electric supply details, such as voltage of the supply circuit, operating current, frequency and power requirements of motor.

6.1.1 Each filtering unit may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirement of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

7. INFORMATION TO BE SUPPLIED BY THE MANUFACTURER

7.1 The manufacturer/supplier shall furnish the following data relating to the filter in addition to the operating and maintenance instructions of the unit:

a) Expected flow rate with oil having viscosity of 150 Redwood Secs. No. 1 at 37·8°C. The flow rate will be based on an operating temperature of approximately 80°C.

b) Full-load heater rating in kilowatts.

c) Power requirements of the motor.

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